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Research Note

Seed Production of Wiregrass in Central Florida Following Growing Season Prescribed Burns

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Abstract. Wiregrass (*Aristida stricta* Michx.) is a major species in the longleaf pine (*Pinus palustris* Mill.) sandhills areas of central Florida, providing a major portion of the fuel for the recurring ground fires necessary to maintain the community. Growing season burning promotes flower and seed production. The objective of this study was to assess the seed production potential of wiregrass following prescribed burns from May through August. Four longleaf wiregrass sites were prescribed burned, one each in May, June, July, and August. Information on bunch size, bunch density, seed stalk density, seed density, and seed germination were collected. The four sites differed significantly in the density of wiregrass bunches, average bunch size, wiregrass cover and seed viability. The density of seed stalks was fairly consistent across sites. Viable seed production was lowest on the June burned site and highest on the July burned site. The study shows good quantities of seed are comparatively easy to produce with growing season burns.

Keywords: *Aristida stricta*; *Pinus palustris*; Elorida; Restoration; Sandhills.

Introduction

Wiregrass or pineland threeawn (*Aristida stricta* Michx.) was once a major understory species in the longleaf pine (*Pinus palustris* Mill.) - slash pine (*P. elliottii* Engelm.), longleaf pine, and longleaf pine - scrub oak types of the Atlantic coastal plain, USA (Eyre 1980). Although the overstory of these forest types varied, wiregrass was a dominant and important understory species on many sites (Duever 1989). It was most prevalent on infertile sands ranging from poorly drained soils, typified by the Leon series (sandy siliceous, thermic Aeric Haplaquod), to excessively drained soils like Lakeland (thermic, coated Typic Quartzipsamment).

Because of the rapid accumulation of fuel (Parrott 1967) and frequent lightning, fire was once a frequent natural occurrence across much of the southeastern coastal plain, maintaining the pine-wiregrass communities (Christensen 1981). These recurrent ground fires reduced the risk of major damaging wildfires and retarded the invasion of pine-wiregrass areas by hardwood species (Platt et al. 1988, 1991). Dead wiregrass is a major fuel source, along with longleaf pine needles, on sandhills of central Florida. The understory of wiregrass also adds organic matter to the soil which improves soil structure and water and nutrient holding capacity (Snedaker and Lugo 1972).

Because wiregrass is sensitive to soil disturbance (Outcalt and Lewis 1990), cultivation for agriculture or mechanical site preparation for reforestation has eliminated or severely reduced it on many areas. Prescribed burning to produce wiregrass seed for use in re-establishment on those areas where it has been extirpated has become important recently. Experimentation with prescribed burning at different seasons has shown that wiregrass will flower profusely following growing season burns (Clewell 1989, Platt et al. 1991). The quantity of viable seed produced following growing season burning, however, is not known. The objective of this study was to document seed production potential of wiregrass on central Florida sandhills following prescribed burning from May to August.

Methods

The study was conducted on the Ocala National Forest in Marion County, Florida, USA. Four sites were randomly selected from sandhills longleaf - wiregrass sites that had been prescribed burned during the growing season of 1991, and that had a longleaf overstory of ages greater than 50 years. All study sites were in stands with no recorded occurrences of past mechanical soil disturbance. Soil on all sites was the dark phase of the Astatula series (siliceous, hyperthermic, uncoated, Typic Quartzipsamment) which is an excessively drained sandy soil with an accumulation of charcoal in the surface horizon. One site each was selected from those burned in May, June, July, and August, respectively. All sites had been ignited using drip torches and were burned with strip head fires. Strip widths had been varied depending on conditions to maintain an average flame length of 1 to 2 meters.

In early December, 1991 fifteen 1-m^2 sample plots were randomly located within each study site (total of 60 plots). On each plot the number of wiregrass clumps was recorded. If plot lines dissected clumps, the portion of the clump within the plot was estimated to the nearest quarter. The length and width of all wiregrass clumps entirely within the sampling area was measured. After measurement, all seed stalks on the plot were clipped and placed in paper bags. In the laboratory seed stalks were counted, and ten stalks were randomly selected from each plot. All seed were manually removed from 10 stalks per sample quadrat and counted. Following counting, seed were placed in germination boxes on germination paper and wet with distilled water. The boxes were put in a room maintained at 24°C and 60 percent relative humidity with 24 hour constant lighting. Seed germination was monitored for 21 days.

Wiregrass basal area was calculated by multiplying the average area occupied by a clump on that plot by the number of clumps. This value was divided by the sample plot area (1-m^2) to give wiregrass basal area cover. Following tests of normality and homogeneity of variances, field and laboratory data were analyzed by analyses of variance with a one way model using month of burn as treatments. Because site and month of burn were confounded, plots within sites were used as replications. Means were compared using the least significant difference test at a .05 probability level.

Results

The number of wiregrass bunches varied significantly across sites (Table 1). The May and June burned areas had a higher density of wiregrass than the two other sites. Both sites were near the average density of 5 bunches per square meter reported as the normal density for wiregrass by Clewell (1989). The mean basal area of a wiregrass clump also varied by site with the May area again having the largest ones. The average diameter of about 23 cm is larger than the 15 cm size previously reported (Clewell 1989). The combined effects of high density and large size gave the May burned site a wiregrass basal area cover double that found on other sites.

Table 1. Wiregrass density and cover following buring of selected sites on the Ocala National Forest.

Month Burned	Wiregrass Bunches+	Bunch Area	Wiregrass Cover
	No./m^2	cm^2	%
May	5.0 c*	520 b	26 b
	±0.3	±79	±3.9
June	4.2 bc	285 a	12 a
	±0.4	±47	±2.2
July	2.9 a	300 a	9 a
	±0.5	±53	±2.4
August	3.1 a	355 ab	9 a
	±0.6	±84	±2.5

+ Means ± standard error.
* Within a column, values not followed by the same letter are significantly different at the 0.05 level.

The density of seed stalks varied between sites but all were in the same order of magnitude and had an overall average of 66/m^2 (Table 2). Total seed density was more variable due to differences in the average number of seed per stalk. The site burned in July had the highest seed density while the June burned site had the lowest seed density. The two areas burned later in the season (i.e. July and August) had significantly greater seed viability than those burned earlier in the growing season.

Table 2. Wiregrass seed production and viability on selected sites following prescribed burning.

Month Burned	Seed Stalks+	Seed	Seed	Seed Viability	Viable Seed
	No./m^2	No./Stalk	No./m^2	%	No./m^2
May	50 a*	24 b	1230 a	7 a	86 a
	±16	±2.2	±615	±1.7	±62
June	62 a	9 a	525 a	5 a	26 a
	±15	1.3	±115	±1.4	±8.8
July	82 a	27 b	2225 a	21 b	520 a
	±23	±2.3	±1065	±3.3	±295
August	69 a	15 b	1010 a	36 c	365 a
	±21	±1.4	±250	±3.7	±105
Mean	66	19	1310	17	250

+ Means ± standard error.
* Within a column, values not followed by the same letter are significantly different at the 0.05 level.

Discussion

This study shows that wiregrass will readily flower and produce significant quantities of viable seed after growing season burns. It also demonstrates that wiregrass will produce seed following fires throughout the growing season with wiregrass burned as late as early August still able to flower and produce viable seed in central Florida. Thus, the production of seed from existing populations for use in restoration of areas where wiregrass has been eliminated can be readily accomplished by prescribed burning within the growing season. Further research, however, is needed to determine the best time to burn to maximize yields. Wiregrass seed production following prescribed burning is also likely to be different in other geographic locations. This is especially likely in the northern region that is occupied by a distinct population of wiregrass which has been proposed as a separate species (Peet 1993).

Although seed was produced on sites burned from May to August, seed yields and viability varied considerably. This variation could be do to pretreatment site differences and/or the timing of burn during the growing season. Also the lower seed viability of areas burned in May and June was likely at least partially due to the greater length of time between seed production and seed collection. It is assumed some viable seed were lost from plots on these sites prior to seed collection in early December.

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